Bulletin of the

University of Minnesota Hospitals
and
Minnesota Medical Foundation

Roentgen Diagnosis Of Gastric Tumors

Volume XXV | Friday, May 28, 1954 | Number 30

BULLETIN OF THE
UNIVERSITY OF MINNESOTA HOSPITALS
and
MINNESOTA MEDICAL FOUNDATION

Volume XXV | Friday, May 28, 1954 | Number 30

INDEX

Published weekly during the school year, October to June, inclusive.

The Bulletin is sent to members of the Minnesota Medical Foundation. Annual membership fee - $10.00.

Address communications to: Staff Bulletin, 3330 Powell Hall, University of Minnesota, Minneapolis 14, Minn.

The publication and distribution of the Bulletin are supported in part by a grant from Lancet Publications Incorporated, Minneapolis, which we gratefully acknowledge.

The following definition of a radiologist was given by Dr. Harry Z. Mellins, formerly a member of our faculty and at present Chief of Radiology at Sinai Hospital, Detroit, at a dinner meeting in that city on October 23, 1953. We think it appropriate to include it in this issue of the Bulletin which we do with Dr. Mellins' kind permission.

RADIOLOGY AS A SPECIALTY IN MEDICINE

The radiologist is a clinician who has sacrificed one of the greatest glories of the practice of medicine, and its greatest responsibility -- the daily contact with the ill and with their families -- in order to concentrate the more on the other essence of our profession, the pathology of the living. This he sees through the medium of shadows, which has left him open to the charge of not quite being a real doctor.

But shadows, after all, are real. What are we to one another and what is the world to any of us, but an inverted image on the retina. Seeing is done with the mind. The camera does not see; it records. The radiologist perceives a shadow, sees a lesion, and imagines the man. The bedside physician sees the man, perceives the signs, and imagines the lesion. They practice from the outside in, and we from the inside out. Both are clinicians, for in truth there is no other kind of doctor worthy of the name. The decisive test for all is finally and always at the bedside. This, then, is one concept of the radiologist -- with a film on the view box, but the bedside on his mind.

Harry Z. Mellins, M.D.

I. THE ROENTGEN DIAGNOSIS OF GASTRIC TUMORS

Leo G. Rigler, M.D.
Donn G. Mosser, M.D.
John A. Amberg, M.D.

The diagnosis of gastric tumors, both benign and malignant, in an early stage is one of the crucial problems of present day radiology. Early diagnosis offers the best prospect for improving our salvage rate in gastric malignancy, and with this thought in mind we undertook a study of all the radiologic examinations of the upper gastro-intestinal tract done in the University of Minnesota Hospitals in the period from January 1, 1939 through December 31, 1950. Our primary objective was to find patients who had a negative examination at one time and subsequently developed gastric malignancy; from this group we hoped to find enough patients to provide significant information concerning the natural history of carcinoma of the stomach and the interval of time necessary for its development.

The mechanism of finding all such patients involved systematic inspection of all the diagnostic x-ray reports during that 12-year period in order to select those patients who fit into this category; in order to be complete we decided to utilize a system which would provide information not only on this particular aspect of the gastric cancer problem but, also, on many other facets of gastro-intestinal x-ray diagnosis.

Method

Of the various methods devised for handling large groups of patients, that of the International Business Machines, or IBM, seemed most suitable, for we knew that approximately 20,000 patients were to be studied. The IBM system makes practicable the consideration of large groups of patients rapidly, and the system is of sufficient interest and value to such studies as to warrant some explanation of its mechanism.

The heart of the IBM system is the $3\frac{1}{4}$ by 7 3/8 inch card into which coded information is punched in 80 columns in a manner similar to the payroll check used at the University. Chart numbers are punched directly, and numbers are assigned for other data, such as age, sex, numbers of examinations, and specific diagnosis. These data were transferred from the x-ray diagnosis card to a form card which would facilitate the subsequent punching of the data into the IBM card by the operator.

The IBM key punch operator codes the data on the IBM card on a typewriter-like machine which punches out holes in the appropriate columns on the IBM card. The next step is the use of an IBM card verifier, which is operated in a similar manner to the punch except that it checks to see that the material was properly punched and discloses errors in the initial operation.

Once the data is coded on the cards, it is readily available according to the goals of the study. An IBM sorting machine operates at 450 cards per minute, sorting out the cards into their proper slots by means of electronic impulses carried by fine wire brushes through the punched holes in the cards as the cards pass through a slot in the machine. The machine can be set to sort and to count the numbers of cards with a particular number punched out of a certain column. Thereby, any card or group of cards can be selected from the entire group by appropriate pre-determined setting of the machine.

If one has a particular interest, he can sort out all the cards pertaining to his study, and, in turn, these cards can be placed in a tabulating machine which will list them in serial order on a continuous sheet of paper, printing the chart number and whatever other information from the card he desires. These lists can be used subsequently for further accumulation of data, procurement of hospital charts, and other functions in such a study as might be desirable.

Although we did not use them in this study, there are a number of other IBM

machines which are of definite value in studies involving large numbers of patients or large amounts of data about a moderate number. For example, a calculating punch can be used which will provide various types of data for statistical analysis in a single operation. The value of such a system properly applied to patients' records or research problems would be inestimable for study purposes in a hospital as large as this.

Findings in the Entire Group

From the entire group of patients considered during the period from January 1, 1939, through December 31, 1950, the following data has been collected:

Total Number of Patients Subjected to Upper Gastro-Intestinal X-ray Examination	21,738
Total Number of Examinations Done	35,396
Total Number of Patients with Positive Findings (39.5%)	8,586
Total Number of Examinations on Patients with Positive Findings	17,205

Data concerning the age and sex distribution in the entire group and in numerous sub-groups has been calculated but is omitted for lack of space and time.

SPECIFIC DIAGNOSES

Esophagus

Malignancy	112
Cardiospasm	45
Esophagitis and Ulcer	33
Diverticulum	95
Varices	48
Miscellaneous	81
Short Esophagus	17
Stricture	31

Stomach

Carcinoma	935
Ulcer	647
Polyp	185
Other benign tumor	18
Hiatus Hernia	592
Stomal Ulcer	91
Outlet Obstruction and Pyloric Stenosis	431
Gastritis and Hypertrophic Rugae	854
Diverticulum	42
Gastroenterostomy	256
Gastric Resection	939
Miscellaneous, Including Extrinsic Pressure	567
Indeterminate, Examination Not Repeated	59

Duodenum

Ulcer--Cap and Pylorus (Crater seen in 1,823)	3,691
Diverticulum, 2nd portion	875
Diverticulum, 3rd portion	337
Benign Tumor	12
Malignant Tumor	18
Fistula	40
Widened Loop	90
Extrinsic Tumor or Pressure	498
Prolapsed Mucosa	207
Obstruction	45
Spasm	222
Anomaly	59
Stasis	126
Ulcer, 2nd Portion	35
Perforated Ulcer	47

While the data accumulated opened many avenues of potential investigation, the gastric cancer problem received the first priority.

From the group of 935 gastric cancers diagnosed, cases were selected in which the original roentgen studies were interpreted as representing either a normal stomach or a non-malignant condition. Later, either roentgen examination or other means established the diagnosis of gastric cancer. There were 73 cases in this group. In a few instances the

diagnosis could not be made until the microscopic examination of tissue removed at surgery was examined.

It should be noted that the roentgen examinations were made by a wide variety of radiologists, the majority by residents in training. It should also be borne in mind that the size of the lesions was in general relatively small.

From the 73 cases were excluded those in which the interval between roentgen examinations was less than six or more than sixty months.

Findings:

There remained 36 cases in which the interval between examinations varied from six to 49 months. The median interval was 13.5 months. The average interval was 20.4 months. The median age was 71. There were 24 males and 12 females.

The patients fell into three classifications. Seventeen were regular hospital patients who were examined usually because of symptoms. Thirteen were in a so-called "precursor" group. These were all patients fifty years of age or older and who had no more than 30 degrees of free acid on gastric analysis. While patients in this group were relatively free of symptoms at the time of first examination they were examined at 6-12 month intervals regardless of symptoms. Six patients were in a Cancer Detection Center group. These patients were all originally asymptomatic. The females were over 45 years of age; the males over 50. All had less than 20 degrees of free acid on gastric analysis. Thus in nineteen patients a definite effort was being made to discover gastric cancer by periodic examination. In the other seventeen the roentgen examinations were the consequence of the clinical picture presented.

Of the total group nineteen had acute symptoms at the time the diagnosis was made. Six had chronic symptoms. Eleven were completely asymptomatic.

All originally had negative physical examinations. Six had positive findings at the time of diagnosis.

Thirty-five had gastric acidity determined at one time or another. Twenty-seven ('77 per cent) were achlorhydric.

Thirty-two of the thirty-six were considered operable. Two refused surgery. Histologic proof was therefore available in thirty cases. Twenty-five cases were resectable. The histologic diagnosis in all cases was adenocarcinoma.

In seventeen cases there was no histologic evidence of spread to lymph nodes. This represents 47 per cent of the thirty-six cases.

All patients were examined with fluoroscopy plus films. The films were available for review in thirty-three cases. In fourteen of these cases there was some evidence of a pathologic process on the early examination. In ten instances this was not recognized at that time but appeared fairly definite in retrospect. In three of the cases a diagnosis of benign polyp and in one case a diagnosis of benign ulcer were made on the first examinations.

In four of the fourteen cases the lesion appeared unchanged on the two examinations. One polypoid lesion remained unchanged over an eighteen month interval. The remaining ten all showed evidence of growth. The rate of growth varied considerably.

The character of the lesions is as indicated in Table I.

Table I

	Positive Nodes	Negative Nodes
Polypoid	9	11
Infiltrative	9	4
Ulcers	1	2
Total	19	17

In five of the thirty-six cases the roentgen interpretation was incorrect. It is of interest to elaborate on these errors. The first case was erroneously diagnosed as an intramural tumor. It appeared to be a smooth lesion with a single central ulceration. It was in the upper third of the stomach on the greater curvature. The second was thought to represent a diffuse ulcerative gastritis. This turned out to represent a diffuse infiltrating adenocarcinoma at autopsy. The third was thought to be a benign ulcer. When no healing occurred after one month of medical therapy it was excised. Grossly it appeared benign; microscopically it was an adenocarcinoma. The fourth and fifth cases were polypoid lesions. One measured two centimeters and was on a stalk. The other measured one centimeter in diameter.

Discussion

We have selected a group of cases of carcinoma of the stomach on the basis that they had a gastro-intestinal examination from 6 to 60 months prior to the establishment of the diagnosis of gastric cancer. In determining the effect of previous roentgen examination it was thought advantageous to compare this group to a control group. The control group represented cases studied by Mason, et al[1] at this hospital. They studied all the hospitalized patients with carcinoma of the stomach over approximately the same time span. Almost all of the thirty-six cases in this study were also in their group.

The ratio of males to females was 3:1 in their group. It is 2:1 in the present cases. The median age in their group was 63; it was 71 in the present group. Their group contained 71 per cent with achlorhydria; the figure is 77 per cent in the present series. All of these factors appear to show little significant differences but in fact emphasize the basic similarities.

In evaluating what constitutes an early case versus a late case it was felt that lymph node spread would be the best criterion. Not only does it split the group cleanly into two sections, but it also has considerable prognostic value as indicated by Balfour[2], and Moore and his associates[3]. Balfour indicates that when there is no lymph node involvement, 48 per cent will survive five years. Current over-all survival rates are in the vicinity of 5-12 per cent.

While it has been shown by Coller[4] that the meticulousness of the pathologic examination significantly alters the percentage of lymph nodes that are found to be positive, the same pathologists were involved in the two groups compared, so that the relative data should be valid even if the absolute data is open to some doubt.

The results of the lymph node study are of considerable interest. In 117 out of 781 cases analyzed by Mason[1] the lymph nodes were negative. The figure of 15 per cent in the unselected group is to be compared with the figure of 47 per cent noted in the thirty-six cases presently studied.

While the number of cases is admittedly small, there still appears to be a significant difference in the two groups. Considering the data of Balfour[2] and Mason[1] a threefold increase in the number of cases with negative lymph nodes, if generally found, would undoubtedly produce a striking increase in the five year survival rates.

The average (20.4 months) and the median (13.5 months) intervals between examinations are also of interest. They reveal that while an interval of three months may be desirable, it is possible to lengthen this period considerably and still improve the percentage of early cases detected. The data also suggests that the growth and spread of gastric cancer is somewhat slower than previously considered.

It is noteworthy also that these results were obtained despite diagnostic errors. Perhaps these errors are inevitable. Templeton[8] has expressed the belief that increased diagnostic accuracy is not the answer to the early detection

of gastric cancer. In reviewing the interpretive errors it is of interest to observe how closely the gross appearance of a malignant lesion may simulate a benign process.

No new method of identifying small gastric cancers was observed. It was apparent that both careful fluoroscopy and routine films were necessary to recognize small lesions.

Summary

Clinical, roentgen and pathologic findings are reviewed in thirty-six cases of gastric carcinoma. The findings indicate that an increase in the number of surgically resectable and curable cases of gastric carcinoma may be obtained by serial roentgen examinations of relatively symptomless individuals. The findings also indicate that reexamination at reasonable intervals, as long as twelve months, will have a pronounced favorable effect.

References

1. Mason, E. E., Kelly, W. D., and Barclay, T. H. C.
University of Minnesota Hospitals Bull. 22:344-51, March 2, 1951.

2. Balfour, D. C.
Annals of Surgery: 105:733-740, May, 1937.

3. Moore, G. E., State, D. E., Hebbel, R. and Treloar, A. E.
S.G.& O.: 87:513-518, November, 1948.

4. Coller, F. A., Kay, E. B., and McIntyre, R. R.
Arch. Surg.: 45:748-761, November, 1941.

5. Templeton, F. E
J. National Cancer Inst.: 7:385-386, April, 1947.

II. MEDICAL SCHOOL NEWS

Luncheon for Senior Medical Students

On Thursday, June 3, the Minnesota Medical Alumni Association will present its annual luncheon for senior medical students. The luncheon, which will serve to introduce the graduating seniors to the activities of the Medical Alumni Association, will be held from 12:30 to 2:00 p.m. in the Junior Ballroom of Coffman Memorial Union. Dr. Harold Benjamin, President of the alumni group, will speak briefly concerning the objectives of the Association, and the featured speaker will be Dr. E. T. Bell.

* * *

A Message From Dr. H. E. "Tiny" Drill

BUILDING FOR THE FUTURE

As your state chairman, it has again been my privilege to attend the A.M.A. committee meeting of the American Medical Educational Foundation, which was held in Chicago on January 24. I was impressed with the personal challenge that faces every doctor practicing medicine in this country, whether he realizes it or not. Too many times the AMEF is thought of as just another organization on a national basis trying to get a donation from the doctor. He may feel that having supported other worthy medical enterprises on a state level that he will let this plea go unheeded. Perhaps he has not taken the necessary time to familiarize himself with the objectives of this fund and how it can affect him directly.

Briefly, the AMEF is attempting to raise funds from individual doctors on a voluntary basis in support of our 79 medical schools who are in dire need of unrestricted funds. In 1953 the University of Minnesota received $28,036.00 from the fund. Such funds are urgently needed over and above those our school gets through legislature appropriations. This leaves the school with many financial deficits to cover such items as augmenting professors' salaries, special equipment necessary for training students, residents and fellows, and research. There are also scholarships and student loans that must be considered.

We are living in a competitive world. Therefore, if we wish to maintain high standards of teaching and techniques, as well as the advancement of science through research, our medical schools must continue to be adequately financed. This can only be accomplished through private or government sources. Endowments and state funds cover less and less of the needs each year because of the rapidly increasing costs. Even now the government is furnishing certain funds to our medical school. Funds received from this source during the past year have been $25,000 for improved cancer teaching, $25,000 for improved teaching of cardiovascular diseases, and $15,000 for improved teaching in psychiatry. These grants, however, are for specific purposes and on a year-to-year basis. Money received from AMEF was used for the following important purposes: salary for a medical artist and illustrator for teaching demonstrations and making charts and lantern slides; employing two animal caretakers for animal research projects; augmenting salaries for an instructor in physiological chemistry, and a teaching assistant in physiology; salaries for two additional internists returned from military service, one to head the out-patient admissions clinic and the other as an instructor in internal medicine. The remainder of the fund will be used to help buy teaching equipment for the new Mayo Memorial Building.

As practicing physicians, we are the recipients of the many new and startling advancements that we have been privileged to add to our armamentarium from year to year. Even if every doctor contributed to the best of his ability in support of this cause, we would not as a group succeed alone. However, we are not alone in this endeavor. Industry has also sensed that it has a large stake in medical education. It, too, is vitally concerned with industrial health and medicine. Support from this large source depends a lot upon the support the medical profession gives this fund. It has been indicated in a definite way that industry feels that the profession can do a better job than it has done. Are we dragging our feet? If we are to leave tracks in the sands of time, we have to wear shoes.

It might be of interest to you who take time to read this that there are 4,288 doctors registered in Minnesota. In 1953 only 222 doctors in Minnesota contributed to AMEF. The breakdown on this reveals that of the four large medical centers, 29 doctors in Hennepin County, 6 doctors in St. Paul, 65 doctors in Duluth, and 21 doctors in Rochester contributed $1,540.00, $170.00, $1,690.00, and $975.00 respectively. Of the remainder of the state, 101 doctors contributed $4,073.00 for a total of $8,449.00. A comparison of 1953 to 1952 contributions shows an increase of from .96% to 5.18%. Not very impressive, is it?

Finally, permit me to point out that every M.D. owes something to his medical school. Aside from the tuition he paid when going through school, he has paid nothing for his education. An alternative to the support of the AMEF program would be to cut down on educational standards, or to accept federal support for our medical school, which I am sure you will agree, the public will not stand for, to say nothing of the profession itself. Do you think enough of your profession to back it up with a contribution?

In the near future you will receive information on the American Medical Educational Fund, together with a request for a contribution from you. I sincerely urge every doctor in the state to support this worthy project.

* * *

Publications of the Medical School Faculty

Berk, R. S., Ross, J. D., and Watson, D. W.: A Quantitative Assay for Streptolysin O. Bact. Proc., p. 29, May 2-7, 1954.

Boucher, N. E., Syverton, J. T., and Bittner, J. J.: An Accelerative Effect of Radioactive Phosphorus (P^{32}) and Cortisone upon the Host Response of Mice to Transplanted Mouse Mammary Cancer. Proc. Am. Assoc. Cancer Res., 1: 6, 1954.

Boyd, W. L. and Lichstein, H. C.: The Effect of Glucose on Tryptophanase Activity. Bact. Proc., p. 104, May 2-7, 1954.

Dick, E. C. and Johansson, K. R.: The Effect of Oral and Intraperitoneal Administration of Two Forms of Penicillin Upon Rats Fed a Vitamin B_{12} Deficient Ration. Bact. Proc., p. 82, May 2-7, 1954.

Eylar, O. R. and Schmidt, E. L.: The Abundance of Heterotrophic Nitrifiers in Soil. Bact. Proc., p. 20, May 2-7, 1954.

Friedman, Jack, Werder, A. A., Roth, F. J., Graham, A. B., Mira, O. J., and Syverton, J. T.: The Synergistic Effects of Roentgen Radiation and Cortisone Upon Susceptibility of Mice to Pathogenic Microorganisms. Am. J. Roentgenology, Radium Therapy, and Nuclear Med., 71: 509, 1954.

III. UNIVERSITY OF MINNESOTA MEDICAL SCHOOL

WEEKLY CALENDAR OF EVENTS

Physicians Welcome

May 31 - June 5, 1954

Monday, May 31 (HOLIDAY)

Tuesday, June 1

Medical School and University Hospitals

9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, Irvine McQuarrie and Staffs; Eustis Amphitheater, U. H.

12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 Institute of Anatomy.

12:30 - 1:30 Bacteriology Seminar; 214 Millard Hall.

3:30 - Biophysics-General Physiology Seminar; 323 Zoology Building.

4:00 - 5:00 Pediatric Rounds on Wards; Irvine McQuarrie and Staff; U. H.

4:30 - 5:30 Clinical-Medical Pathological Conference; Todd Amphitheater, U. H.

5:00 - 6:00 X-ray Conference; Presentation of Cases from Ancker Hospital; Drs. Aurelius, Peterson, and Niknejad; Eustis Amphitheater, U. H.

Ancker Hospital

9:00 - 10:00 Medical X-ray Conference; Auditorium.

Minneapolis General Hospital

9:30 - Pediatric Rounds; Elizabeth Lowry; Station J.

10:00 - Psychiatry Grand Rounds; R. W. Anderson; Station H.

11:30 - 12:30 Neurology-Neurosurgery Conference; Classroom, Station M.

12:30 - 2:30 Dermatology Rounds on Clinic; Carl W. Laymon and Staff.

12:30 - ECG Conference; Boyd Thomes and Staff; 302 Harrington Hall.

1:00 - Tumor Clinic; Drs. Eder, Coe, and Lipschultz; Classroom.

3:30 - Pediatric-Psychiatry Rounds; Jack Wallinga; Station I.

Veterans Administration Hospital

7:30 - Anesthesiology Conference; Conference Room, Bldg. I.

Tuesday, June 1 (Cont.)

Veterans Administration Hospital (Cont.)

8:45 - Surgery Journal Club; Conference Room, Bldg. I.

9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.

10:30 - Surgery-Tumor Conference; L. J. Hay, J. Jorgens and Donn Mosser; Conference Room, Bldg. I.

1:00 - Review of Pathology, Pulmonary Tuberculosis; Conference Room, Bldg. I.

1:30 - Combined Medical-Surgical Chest Conference; Conference Room, Bldg. I.

2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.

4:00 - Thoracic Surgery Problems; Conference Room, Bldg. I.

Wednesday, June 2

Medical School and University Hospitals

8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Paul Lober, and L. G. Rigler; Todd Amphitheater, U. H.

11:00 - 12:00 Pathology-Medicine-Surgery-Pediatrics Conference; Todd Amphitheater, U. H.

12:30 - 1:20 Radioisotope Seminar; Underground Cobalt Unit, U. H.

12:30 - 1:30 Physiology 114C--Respiration; E. B. Brown; 214 Millard Hall.

1:00 - 2:00 Dermatology Clinical Seminar; F. W. Lynch; 300 North Clinic.

1:30 - 2:30 Physiology 114B--Transport Seminar; Nathan Lifson and M. B. Visscher; 271 Lyon Laboratories.

1:30 - 3:00 Pediatric Allergy Clinic; Albert V. Stoesser and Lloyd Nelson; W-211, U. H.

3:30 - 4:30 Dermatology-Pharmacology Seminar; 3rd Floor Conference Room, Heart Hospital.

5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater, U. H.

5:00 - 6:00 Residents' Lecture; Complications of Fractures; Kenath H. Sponsel; Todd Amphitheater, U. H.

5:30 - 7:30 Dermatology Journal Club and Discussion Group; Hospital Dining Room.

7:30 - 9:30 Dermatology Seminar; Review of Interesting Slides of the Week; Robert W. Goltz; Todd Amphitheater, U. H.

Ancker Hospital

8:30 - 9:30 Clinico-Pathological Conference; Auditorium.

12:30 - 1:30 Medical Journal Club; Library.

Wednesday, June 2 (Cont.)

Minneapolis General Hospital

9:30 - Pediatric Rounds; Henry Staub; Station I.

10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.

12:00 - Surgery Seminar; Arthur Zierold; Classroom.

12:30 - Pediatric Staff Meeting; Classroom; Station I.

1:30 - Pediatric House Staff Seminar; Erling Platou; Station I.

1:30 - Pediatric Rounds; Erling Platou; Classroom, Station I.

Veterans Administration Hospital

8:30 - 10:00 Orthopedic X-ray Conference; E. T. Evans and Staff; Surgical Conference Room, Bldg. 43.

8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. R. Baker.

9:00 - Gastro-Intestinal Rounds; Drs. Wilson, Zieve, Hay, Prakel, Nesbitt and O'Leary.

11:00 - Gastroenterology Conference; Conference Room, Bldg. I.

12:30 - Medical Journal Club; Doctors' Dining Room.

12:30 - X-ray Conference; J. Jorgens; Conference Room, Bldg. I.

1:30 - 3:00 Metabolic Disease Conference; Drs. Flink, Schultz and Brown.

3:30 - Urology Pathology Slide Conference; Dr. Gleason; Conference Room, Bldg. I.

7:00 - Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, June 3

Medical School and University Hospitals

9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

11:00 - 12:00 Cancer Clinic; K. Stenstrom, A. Kremen and R. Zimmermann; Todd Amphitheater, U. H.

1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.

5:00 - 6:00 Radiology Seminar; Hiatus Hernia; M. Azad; Eustis Amphitheater, U. H.

Ancker Hospital

8:00 - 10:00 Medical Grand Rounds; Auditorium.

Minneapolis General Hospital

9:30 - Neurology Rounds; Heinz Bruhl; Station I.

9:30 - Pediatric Contagion Rounds; R. B. Raile; Station K.

10:00 - Psychiatry Grand Rounds; R. W. Anderson and Staff; Station H.

11:30 - 12:30 Clinical Pathological Conference; John I. Coe; Classroom.

Thursday, June 3 (Cont.)

Minneapolis General Hospital (Cont.)

12:30 - 2:30 Dermatology Rounds and Clinic; Carl W. Laymon and Staff.

1:00 - Fracture - X-ray Conference; Drs. Zierold and Moe; Classroom.

1:00 - House Staff Conference; Station I.

Veterans Administration Hospital

8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.

8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.

8:30 - Hematology Rounds; Drs. Hagen and Fifer.

11:00 - Surgery-Roentgen Conference; J. Jorgens; Conference Room, Bldg. I.

1:30 - 4:30 Infectious Disease Conference and Rounds; Wesley W. Spink; Conference Room, Bldg. I.

Friday, June 4

Medical School and University Hospitals

8:00 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.

9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U.H.

10:30 - 11:50 Medicine Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.

10:30 - 1:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.

11:00 - 12:00 Vascular Rounds; Davitt Felder and Staff Members from the Departments of Medicine, Surgery, Physical Medicine, and Dermatology; Eustis Amphitheater, U. H.

11:45 - 12:50 University of Minnesota Hospitals Staff Meeting; Minnesota Studies on the Broncho-Pulmonary Segments; Edward A. Boyden; Powell Hall Amphitheater.

1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.

1:30 - 2:30 Dermatology Grand Rounds; Presentation of Cases from Grouped Hospitals (University, Ancker, General and Veterans) and Private Offices; H. E. Michelson and Staff; Eustis Amphitheater, U. H.

2:30 - 4:00 Dermatology Hospital Rounds; H. E. Michelson and Staff; Begin at Dermatological Histopathology Room, M-434, U. H.

3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.

3:30 - 4:30 Dermatology-Physiology Seminar; 3rd Floor Conference Room, Heart Hospital.

4:00 - 5:00 124 Advanced Neurophysiology Lecture; Werner Koella and Ernst Gellhorn; 111 Owre Hall.

4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hanson and Staff; E-534, U. H.

5:00 - Urology Seminar and X-ray Conference; Eustis Amphitheater, U. H.

June 4 (Cont.)

Ancker Hospital

1:00 - 3:00 Pathology-Surgery Conference; Auditorium.

Minneapolis General Hospital

9:30 - Pediatric Rounds; Elizabeth Lowry; Station J.

10:30 - Pediatric Surgical Conference; Tague Chisholm and B. Spencer; Classroom, Station I.

12:00 - Surgery-Pathology Conference; Dr. Zierold, Dr. Coe; Classroom.

1:00 - 3:00 Clinical-Medical Conference; Thomas Lowry; Classroom, Station M.

1:30 - Pediatric Contagion Rounds; L. Wannamaker; Station K.

Veterans Administration Hospital

10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.

1:00 - Chest Pathology Follow-up Conference; E. T. Bell; Conference Room, Bldg. I.

2:00 - Clinicopathologic Conference; Conference Room, Bldg. I.

Saturday, June 5

Medical School and University Hospitals

7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.

9:00 - 10:30 Pediatric Grand Rounds; Eustis Amphitheater, U. H.

9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; Heart Hospital Amphitheater.

9:15 - 10:00 Surgery-Roentgenology Conference; L. G. Rigler, J. Friedman, Owen H. Wangensteen and Staff; Todd Amphitheater, U. H.

10:00 - 11:30 Surgery Conference; Todd Amphitheater, U. H.

10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.

Ancker Hospital

8:30 - 9:30 Surgery Conference; Auditorium.

Minneapolis General Hospital

8:00 - Urology Staff Conference; T. H. Sweetser; Main Classroom.

9:00 - Psychiatry Grand Rounds; R. W. Anderson; Station H.

9:30 - Pediatric Rounds on all Stations; R. R. Raile.

11:00 - 12:00 Medical - X-ray Conference; O. Lipschultz, Thomas Lowry and Staff; Main Classroom.

Veterans Administration Hospital

8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.

8:30 - Medical X-ray Conference; Conference Room, Bldg. I.